

## Report of Kerala University Curriculum Fair 2017



#### CURRICULUM DEVELOPMENT CENTRE



Internal Quality Assurance Cell (IQAC) University of Kerala 2017 "Kerala University Curriculum Fair 2017" was organised under the joint auspices of Curriculum Development Centre, University of Kerala and IQAC, University of Kerala. Dept. of Educaion, University of Kerala and FLAIR, Government of Kerala provided all external support. The fair had been host to 42 posters depicting curriculum innovation. Dr. Asha J.V was the Co-ordinator of the programme. This report compiles the proceedings, participants list and the posters. It is expected that the report would trigger wider participation in coming year

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#### Report of Kerala University Curriculum Fair 2017

Jointly organized by Curriculum Development Centre, UoK & IQAC, UoK

"Kerala University Curiculum Fair 2017" was organized under the joint auspices of Curriculum Development Centre, University of Kerala and IQAC, University of Kerala. Altogether, 42 posters articulating curriculum innovation which showed clear roadmap to encourage educators to defy the conventional norms and think outside of the box to reach all types of learners with individualized styles were presented in the Fair. Dr. Asha J.V, Hon.Director, Curriculum Development Centre was the Coordinator of the programme. This report compiles the proceedings, participants list and the posters. It is expected that the report would trigger wider participation in coming years.

The posters presented in the Curriculum Fair-2017 generally provided strong support for students' social development. The entries in the Fair-2017 depicted blueprints of opportunities to work collaboratively, in pairs and in groups, and to develop the skills of teamwork and leadership. They also had rich opportunities for discussion and debate, often with representatives from the wider community and business. This was more than an academic exercise, since many of the posters illustrated ways to tackle real issues with real people. The Fair-2017 witnessed pockets of innovation sprouting up across the educational landscape. But our universities continue to keep at arm's length in democratizing imperative of "giving voice" to the innovative ideas. The Curriculum Fair-2017 was in letter and spirit a platform for showcasing the reality that curriculum implementation is the reaction between the teachers, learners and other stake holders in education geared towards achieving the objectives of education. The Fair-2017 was also a platform which corroborated the academic insight and strength of the faculty of Kerala University departments to translate their idea into workable blueprints and to develop program for its successful implementation.

The Curriculum Fair was designed for two days. Posters representing innovative ideas were invited from Teachers of Universities, Colleges and teacher education institutions sufficiently early. Forty two entries in the form of Posters were received

for the Fair. All the posters were arranged on the Senate Hall Stage in a systematic way.

The inauguration of the Fair began with a prayer followed by the welcome address delivered by Dr. Asha J.V., the Hon. Director of the Curriculum Development Centre, Dept. of Education, University of Kerala. It was followed by a key note address by Prof. Achuthsankar S. Nair, Director, IQAC & HoD, Dept. of Bioinformatics and Computational Biology, University of Kerala. Prof. Theresa Susan, Head, Dept. of Education chaired the session. The formal Inauguration of the Fair was done by the team of experts. Prof. K.R. Sivadasan, Prof V.Reghu, Prof. K.Reghunathan Pillai and Dr. K.Gopalakrishnan stepped in to view the posters and interacted with the presenters. There was a non competitive evaluation using a tool developed for the purpose. Teams of student teachers from different teacher education colleges along with their Teachers visited the Fair. Besides, teachers, Research Scholars, NGOs, teachers and students from Arts and Science Colleges and University Departments viewed the exhibited posters. The exhibition lasted till 5.00 pm in the evening on 16-03-2017.

All the visitors appreciated the conduct of the Fair. Local hospitality was provided to the participants of the Fair.

Dr Asha J.V., Hon. Director, Curriculum Development Centre, Department of Education, University of Kerala.

#### Formal Inauguration of the Fair



#### Welcome Speech



#### Key note Address



#### **Presidential Address**



#### **Experts assessing Fair entries**





#### **Expert Team with Faculty Members**



#### Flair Team with Prof Achuth Sankar S. Nair



Brochure





The Second Arrural Curriculum Fair and Exhibition will be held during March 1-4, 2017 from 10 a.m. to 5 p.m. This is an innovative approach to display the curricular changes modelled in unique fashions. This event will provide the academic community with an intellectually stimulating and collaborating experience to pool their expertise. It is hoped that this will be a platform for pulling together enthusisabit teachers of University, its affiliated coleges, DIETs and TTIs to display the best curricular practices and cross ourricular tideas for the appreciation and consideration of the wider academic community.

Those who are interested to pertake may prepare posters of maxmum size 90cm/30cm depicting the unique curricular practices along with pictures. The posters shall engage students in real problem solving scenario. The entires for the Fair should ideally involve:

## A new area of study

An Innovation (in the classroom , in the curriculum, innovative application and execution skills, Continuous improvement)

should also:

## A display of a successful unique practice in classroom learning (Genuine learning environment/Learner-centered approach/ Continuous

learning process/Learning in real-life situations)

A greater in depth presentation of student engagement in something with contemporary relevance (Students' academic engagement/ commitment to ethical values' self-development and development of the affective domain/ enhancement of thinking skills/Faculty engagement and dissemination of knowladge/ Responsiveness, accountability and commitment to the community and region) email address: ashajv3@gmail.com Phone No. : 04/1 2304/18 Mobo. : 9447043469 Mobo. : 9447043469 Contact : Curriculum Development Centre Dept. of Education, Thycaud, Thiruvananthapuram

edge.

## Concept note

The UCC National Curriculum Development Centre of the University of Kerala is a study centre of the University functioning at the Department of Education to carry out innovative measures in the iness of enhancing scholarship, progressing research and encouraging extension activities in the field of Curricular interventions. The Centre, along with the Department of Education, ICAC and FLAIR put their resources together and organised a maiden verture in the form of the 'Curriculum Fair -2016' for teachers and students of colleges and higher escondary schools with the intention of providing basic awareness in curricular innovations. It is understood then that a Fair like this would be a sincere effort to familarize and equip practising teachers and student teachers to think in novel ways and put forward fresh ideas to refresh our curriculum, its transaction and knowledge generation.

The posters exhibited should display the relevance of the present theloric of learning as distinct from earlier concepts of education. They

# explore the successful practices in Curriculum and its transaction

- depict the importance procession, in the curriculum, innovative depict the importance in the classroom, in the curriculum, innovative application and execution of skills for continuous improvement. bring out the genuine learning environment prevalent in learnercentred approaches which triggers continuous learning process
  - facilitate learning in real-life situations

## provide ways to promote experiential learning

Any area of learning presented in a rovel way to facilitate curricular innovation can be the theme of the poster provided it should be a testimony to the costability and potentiality of today's knowledge society. Also the posters must depict how academic engagement can help students fashion their self-development, especially the development of the affective domain, enhancement of thinking skills and dissemination of knowl-

## Specifications of the Poster

Those who wish to present posters must prepare it with a maximum size 90cm x 90cm depicting the unique curricular practices along with pictures. The viewer should walk away remembering you and your work, not the way the poster locked. Your poster should include the following elements:

Title

## Author(s), with affiliations and emails

## Text Size

The body of your poster should have a minimum 24 point font. Viewers should be able to read your smallest text from a few feet away. The title of your poster should have a 50+ font size, depending on

the size of your poster and the length of the title.

## Font Choice

Avoid using more than 2 or 3 different fonts in one poster. Avoid elaborate, difficult-to-read, or cartoon-like fonts.

## Text Alignment

In general, left-align your taxt boxes (with the possible exception of your title and any image captions). Avoid centering the text on your whole poster.

## Images - Best Practices

Be careful to check your images to make sure that the resolution is appropriate for your large format poster. Sometimes images that look great on the web are much too small to print at 90cmx90cm. Use the Zoom button (in the View tab) to look at your poster at 100% scale. Do your images still look good?

## Final Checklist

- Can you read the title from several feet away?
  - O Did you include all relevant sections?
- O Are authors listed? With contact information?
- Double check your images at 100% resolution
- Double check the labels on your figures and tables
  - Did you save your poster as a XPS/PDF/ODT?

#### **Students viewing Posters**















		PARTICIPANTS' LIST	
Sl No	Name	Designation	Title of the Poster
1	P. Nisha & Dr. Issac Paul	Lecturer Planning and Management, DIET, Palakkad & Asst. Professor GCTE, TVM.	Graphic Organizer Based Bilingual Instructional Practices to Develop Creative Writing Skills in English (Among Elementary Learners)
2	Dr. Shifa. S	Associate Professor Dept. of Malayalam, UoK	Samvaadangaliloodeyum Kazhchakaliludeyum Vikasikkunna Vijnana Mandalam.
3	Dr. Smitha. S	Asst. Professor SNTC, Nedunganda	Transformational Leadership and Total Quality Management in Higher Education Institutions
4	Madhu S Nair & Nirmal S Nair	hu S Nair & Asst. Professor & Dept. of Computer Science, hal S Nair Besearch Scholar Dept. of Computer Science, UoK Besearch Scholar Dept. of Computer Science, UoK	
5	Dr. Divya.C. Senan	Asst. Professor Dept. of Education, UoK	A Curriculum Design Approach Using Mobile Applications and Geo-Spatial Technology to Promote Energy Literacy
6	Dr. Sindhya V	Asst. Professor Dept. of Education, UoK	Ripples on a pond model in curriculum design
7	Sibi. K. S	Asst. Professor Dept. of Physics, UoK	A Stable Multivibrator Using Drama in the Classroom
8	Muhammad Mansoor. A	Teacher Educator Govt. Teacher Education Institute, Alappuzha	Use of K-W-H-L-A-Q Charts as a Means for Effective Environmental Education
9	Onathara Binita & Dr.M. Jessa	Senior Research Fellow & Associate Professor Farook Training College & Research Centre in Education Kozhikode.	Ancient values in 21 <sup>st</sup> Century Character Education context
10	Binitha Das. D. B	Asst. Professor in Physical Science, CSI College of Teacher Education, Parassala.	Neuro Learning
11	Dr. Uday Sankar. S. Nair & Dr. Divya.C. Senan	Dept. of Atmospheric Science U o Alabama in Huntsville, USA & Asst. Professor Dept. of Education, UoK	Crowd Sourcing Applications as Tools for Research and Experiential Learning in Environmental Science

12	Sunitha. P	Dept. of Computational	A Unique Project Management
	&	Biology & Bioinformatics,	and Monitoring System
	Dr. Achuthsankar. S. Nair	UoK	
13	Dr. Meena. T. Pillai	Director	The Introduction of Cultural
		Centre for Cultural Studies,	Studies at the University of
		UoK	Kerala: A story of Academic
			Exigency and Cultural Critique
14	Jasmin Asaf	Research Scholars	21 <sup>st</sup> Century Learning and
	&	Dept. of Education, UoK	Innovative Skills
	Priyamol .T.K		
15	Karthik Mohan	Asst. Professor	Technology Enhanced Learning-
		Dept. of Architecture	Smart Phone as a Tool for Class
		College of Engineering, TVM.	Assignments
16	Madhubala	KUCTE, Kariavattom	Cognitive Pedagogy for
	Jayachandran		Mneumonic Perception
17	Maya Pillai	Associate Professor	Learning that Works!!!
		PKM College , Madampam.	
18	Philomina Simon	Dept. of Computer Science,	Design Thinking- Process of
	&	UoK & Infosys Ltd.	Problem Solving
	Shaji. K		
19	Philomina Simon	Dept. of Computer Science,	Teaching Model Based on
		UoK	Fractal Design
20	Prasanth.R	Asst. Professor	The Synectic Model for
1		KUCTE, Nedumangad.	Teaching English
21	Dr. E. Shaji	Asst. Professor	Geology Field Work- Touring
		Dept. of Geology, UoK	Through Time- Yoga of Geology
- 22			Curriculum
22	Prasheeda . P	Senior Research Fellow	Doctoral Researches in Science
		Farook raining College	Education of Kerala University
22	Dochina Conia C D	Driversity of Calicut	Cognitiva Neuroscience
25	Roodina Sonia. S. K		Implications for Education
	A Rochne V Const	UOK	Implications for Education
24	Dr Asha IV	Asst Professor	Exploring Opportunities and
<i>2</i> 4	D1. A511a J. V	Dent of Education Uok	Challenges of Mobile Learning
			Anns in Physics Instruction
25	Sreekala A S	Research Scholars	Capstone Courses in Higher
23	SICERAIA .A. S	Dent of Education Uok	Education
	Liby Cherian		Lucuton
26	S Vijava kumar	IOAC UoK	Mind Manning
20	Prof. Ganesh C	Dept of Commerce UoK	Global Initiative of Academic
2,	Tion Guildhi C.		Networks (GIAN)
28	Biji, C. L	Dept. of Computational	Research Methodology:
_0	&	Biology & Bioinformatics	Learning by Doing
	Dr. Achuthsankar, S	UoK	
	Nair		

29	Subhaprabha. S	Research Scholars	Environmental Issues and
	-	Dept. of Education, UoK	Sustainable Development
30	Jayachandran. M	Asst. Professor	Water Resource Management
	_	School of Pedagogical	_
		Sciences, Kannur University	
31	Rajeswari. V. S	Junior Research Fellow- UGC	Incidental Learning
32	Dr. Reshma. J. K	Asst. Professor & Head	Portfolio Preparation – An
		Dept. of Environmental	Innovative Tool for Assessment
		Science	
		All Saint's College, TVM.	
33	Sajeena.S	Research Scholar	Knowledge Generation through
		Dept. of Education, UoK	the Development of Hot Skills
34	Dr. Baiju. K. C	HoD, Dept. of Economics	A Human Development
		Central University of Kerala,	Perspective
		Kasargod.	
35	Dr. Christabell. P. J	Asst. Professor	Innovata – Learning from
		Dept. of Futures Studies, UoK	Company's Experiences
36	Dr. Bushra Beegom. R.	Asst. Professor	Skype Learning Creates Smart
	Κ	Dept. of Sociology, UoK	Classrooms
37	Dr. Padmapriya. P. V	Asst. Professor	Be Innovative Yourself with
		NSS Training College,	Modern Pedagogical Strategies
		Pandalam.	
38	Dr. Rajeswari. K	Asst. Professor	Innovative Practices for
		GCTE, TVM.	Popularising Science
39	Dr. Suma. K. O	Associate Professor	Digital Tools and Devices to
		NSS Training College,	meet the Needs of Diverse
		Pandalam.	Learners
40	Sreejith. P	Asst. Professor	GIAN Course on Principles &
		Dept. of Zoology, UoK	Applications of Wide-Field and
			Confocal Microscopy/ Image
			Analysis and live Cell Imaging
41	Anil. A. R	Associate Professor and Head,	Cloud Computing in Education
		Department of CSE, Sree	
		Buddha College of	
		Engineering, Pattoor,	
		Alappuzha.	
42	Suhara Beevy S	Associate Professor and Head,	Department Profile
		Department of Botany, UoK	





കേരളസംസ്കാരമുമായി അസക്ഷട്ട ഡാലങ്ങൾ, സ്മാരകങ്ങൾ എന്നിന്ദ ഉൾപ്പെടുത്തിക്കൊങ്ങുള്ള വിനോറക്കാത്രകൾ നടത്തുന്നത് കാഴ്ച്ചമിലൂടെ ചരിത്രങ്ങോലമുണ്ടാമാനും പ്രകൃതിക്കായി കൂടുതൽ മെടുമാനരം മേറിമാനം സഹാമിക്കം.

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#### Transformational Leadership and Total Quality Management in Higher Education Institutions Dr. Smitha S, Assistant Professor, Sree Narayana Training College, Nedunganda



#### **PROLE:** Practice cum Research Oriented Learning Enrichment

Madhu S. Nair and Nirmal S. Nair Department of Computer Science, University of Kerala, Kariavattom, Thiruvananthapuram - 695581

#### Introduction

The education sphere is inseparable and totally interconnected with the economic, social and cultural spheres. The changes occurring in these spheres constantly generate ew challenges for education. The education system must be able to adapt to these changes by providing appropriate and timely responses to emerging challenges.

In the current scenario, our objective should be to prepare professionals who are capable of comprehensive research, design and entrepreneurial activities.

#### **PROLE** Learning

PROLE learning helps students to verify how the knowledge they acquired in lectures and courses, that focus on the theoretical background, can be applied in practical processes. It promotes the generation of new ideas and thoughts, in-stead of disseminating already known knowledge.

PROLE is a hands-on approach, working in small teams, getting to know research as a work process; first drafting a project jointly with the instructors, then building the team, dividing the work, executing it, making adjustments after getting feedback, writing it down, presenting it to other students, and in the end to a general public.

The idea behind PROLE is to let students work as independently as possible, accompanied and supported by their academic mentors, who guide and help them with soft skills, thereby providing an environment of interdisciplinary ex-change that is conducive to developing the project.

- Inquiry-based activities
- Promotes new ideas and thoughts
- Problem-based and project-organized



Implementation of existing techniques

Evaluate the resulting method

PROLE Methodology

Ideate with collegues and teachers to devise new techniques



#### Benefits of **PROLE**

Develop scientific attitude and analytical skills

Publication of results

- · Experience of teamwork on solving real-world tasks
- · Reduce significantly the adaptation period of the graduate to his/her work environmen
- · Students are better prepared for a career in science or research by the development of scientific competence
- · Enrich educational programmes with the latest develop ments in the discipline

The Department of Computer Science at University of Kerala pursues the strategy of PROLE during the 1<sup>st</sup> and 2<sup>nd</sup> semester of the M.Tech course, in line with the standards of the classical disciplines. At the end of their studies, students are able to autonomously identify current and future problems, work on complex tasks, and develop sustainable solu-tions with the help of scientific methods.

As a result of this approach, the 1st and 2tt senseter M.Tech students were able to publish **6 papers** in reputed international journals and conferences during the period **2012**-2016

Conclusion





#### A Curriculum Design Approach Using Mobile applications and Geo Spatial Technology to Promote Energy Literacy Dr.Divya C.Senan



Fulbright Fellow ,Department of Atmospheric Science, University of Alabama in Huntsville, USA & Assistant Professor, Department of Education, University of Kerala

#### Background

Global economic and ecological issues have generated increased awareness of depleting energy resources and increased embusiam for energy conservation. However, there remains a general lack of understanding with respect to the fundamental concepts of energy science. Since 1979, energy education has been promoted in various countries such as the United Kingdom, the United States, and Australia (Hsu, Huang, Fu, & Teng, 2010).In India several universities has started energy science as main subjects and a couple of energy education programs are organised by Energy management centres. But our country still lacks the implementation of an energy curriculum in elementary and secondary schools.

The success of an energy education program requires a comprehensive assessment to ensure that its educational objectives align with the criteria reforency literacy, which include not only cognitive aspects, but also affective and behavioural characteristics. With regards to the affective and behavioural aspects of energy literacy, an energy literate person is sympathetic to the needs of energy conservation, cognizant of the impact that personal energy use decisions and actions have on the environment and society, and makes with respect to energy resources development and energy consumption (Dewaters & Powers, 2011; Kuhn, 1980; Valhov & Treagust, 1988).

The topics of sustainable development, renewable energy sources, energy efficiency, energy consumption and conservation belong to urgent societal problems in need of solutions and are included in various national formal science curricula both in primary and secondary education. Not much, however, is known about how school knowledge on issues such as energy consumption, environmental protection, sustainable development or energy conservation interact with daily life experiences and views of young people on these issues, whether connections between school subjects, daily life experiences and global societal issues help make abstract school knowledge meaningful and usable in practice. Alfordances for capturing moments of curiosity that obile devices have, can help to increase awareness of what is happening in the surrounding world and contextualize learning. These affordances make such devices natural partners of environmental education. Thus, mobile devices ome effective tools during exploratory activities outdoors and during the process of sense-making of these activities. Mobile devices can create bridges between formal and informal learning, bringing the richness of authentic learning experiences into the classroom. Also the use of geospatial information technologies (GIT), such as Google Earth or GIS to spatially explore environmental issues during classroom investigations has proven to be an effective agent in the development of accurate scientific understandings about complex environmental concepts (Bednarz, 2004; Carrara & Fausto, 1995; Heit, Shortreid, & Parker, 1991; NRC, 2006). Technological innovation not only meets the important criteria for developing students' key skills in using information technology but they have challenged traditional approaches to fieldwork and underpinned updating of existing fieldwork activities and the exploration of new approaches (Teeuw et al. 2005).

Understanding energy resource issues involves geospatial analysis and reasoning skills a curriculum can be related by integrating geospatial technologies (GT) as a learning technology. GT are tools that allow for the processing of geospatial data into visualizations to make decisions about some portion of the Earth. GT can be used to facilitate problem solving in energy learning activities. The adoption of an energy resources curriculum that integrates Mobile application and GT with investigative learning activities to promote energy literacy goals is timely and leverages the current international attention on energy resources and related environmental issues.



Many fundamental energy resource concepts such as understanding how various sources of energy can be used to power human activities through energy transfer from source to destination are spatial in nature (U.S. Department of Energy, 2012). Teaching with mobile App and GT is increasingly viewed as a way to provide students with opportunities for critical thinking and to participate in authentic scientific inquiry approaches to learning (Kerski, 2008; NRC, 2006). The approach create a learning environment in which students can visually explore, analyze, and make decisions about problems in an interactive and challenging manner (Audet & Ludwig, 2000) providing authentic, inquiry-based learning with the K-12 classroom environments (Bednarz & Audet, 1999). When students manipulate and analyze georeferenced data layers, they can explore complex relationships and patterns in meaningful ways to address investigative questions. Thus, GT can extend the ability for students to conduct practices that scientists employ. The adoption of such a curriculum helps the students to have an experiential learning approach towards learning which may create the students as generators of knowledge Hence, the project intend to develop a middle-level science energy resources unit that aligned to energy literacy Framework identified by Department of Energy (DOE), USA (AAAS, 2007; NRC, 1996) using a Mobile application integrated geospatial curriculum approach.

This project proposes to develop a curriculum for energy education based on geospatial technology and crowdsourcing mobile application and will be field tested in various educational institutions in Alabama, USA and Kerala, India through experiential learning approach.



#### Curriculum Design

The present energy education curriculum is proposed to be developed by integrating mobile App with Geo spatia technology implemented through inquiry based experimental learning approach. A mobile application in the android platform will be used for the study. The Energy Literacy Framework (USA), developed by the United States Department of Energy (US DOE) to improve energy education for individuals and communities, will serve as model for the proposed curriculum development. It is decided to use national and state standards to provide guidelines for the science and geographic content in addition to the science inquiry and spatial thinking skills that schools must focus on The curriculum aligns with the Energy Literacy Framework. introducing students to energy basics while emphasizing the connection between our energy use and consumption, the resulting impact on our climate, and energy solutions that mitigate its impact. The curriculum includes principle regarding various sources of energy where one could use inquiry based geospatial analysis to learn about alternate energy sources, namely solar and wind. Using GIS, one can determine the most favourable locations for wind farms based on the cost of transmission, locations of load centres and wind resources and the layout of the electrical grid. Geospatial ology experts say that the technology provides a means for identifying and quantifying the factors affecting the potential of available solar energy. In addition, it also helps enrich the database. Geospatial technology helps in collecting, exploring, analysing, and visualising the biomass data. Researchers claim that they use a combination of historical data, satellite imagery and productivity models to determine best-case estimates of potential yields and of how much biomass could sustainably contribute to the world's energy needs.



Another principle makes direct connections between energy use and quality of life. This principle is important in that it expands student thinking beyond their personal experiences with energy and illustrates ways in which energy can impact the economics, security, environment, and health of societies These concepts are abstract for many students and will encourage them to think outside of their concrete frame of reference. Students will need to be exposed to ideas, values and scenarios from other cultures in order to appreciate how energy choices differ around the world. The present curriculum enable the Middle school students to examine 'a day in the life' scenarios. Here one could use mobile app to conduct anonymous surveys to collect data about energy usage and quality of life. For example students could upload data on electricity bill and different appliances that they have at home. This could also include fuel consumption for transport and cooking. Students could analyze this data and te energy choices, quality of life and cost. Also they could act on several questions like- How much energy do children use in various countries? What differences in culture and lifestyle contribute to different energy use patterns? How do climate, transportation, food and standard of living affect energy consumption? And how does the availability of energy affect the quality of life?

The ultimate goal of curriculum is to demonstrate the importance of providing students with educational experiences that expose them to broad content knowledge as well as opportunities that directly foster positive energy-related atitudes and values, and provide opportunities to learn effective decision making, critical analysis, and action strategies. Wider implementation of energy curricula may serve to move us one step further toward developing a more energyliterate population.



#### Why it is necessary to conduct the research onsite in the United States?

To better educate Americans about energy, the U.S. Department of Energy (DOE) is leading a collaborative effort called the Energy Literacy Initiative (ELI), to define and promote energy literacy. DOE's energy literacy efforts bring together stakeholders from federal agencies, universities, community colleges, professional societies, national labs, power utilities, museums, community organizations, business and industry, interested members of the public and more. The model for the framework - Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education, provides context, background and definitions, along with identifying the essential principles and fundamental concepts that underlie energy literacy. The framework clarifies the expectations of what an Energy Literate student will know. These can guide the creation of a coherent instructional program that helps students achieve this understanding. DOE announces that the second phase will focus on developing education and outreach materials to accompany the framework, establishing alignments between existing materials and the energy principles and concepts, and providing energy education opportunities for people across the nation. It offers a framework upon which curricula can be based without prescribing when, where, or how content is to be delivered. The Energy Literacy Framework (USA), developed by the United States Department of Energy (US DOE) to improve energy education for individuals and communities, will serve as model for the roposed curriculum developmen



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SIDI K. S.\*, ADERSH V., NIMA A.M., ARATHY CHAND, NITHIN J.S., PRAVITHA P., AKHILA S.S., NITHIN GOPI, DHANUSH S.R. Department of Physics, University of Kerala, Kariavattom Campus, Thiruvananthapuram, Kerala - 695581

Abstract

Drama is a potentially powerful tool for connecting students with learning and content. We know that learning is an active, constructive process of coming to know. And through our classroom involvement with students, we have found that drama can provide a process for learning by living through or experiencing an event. Drama by its very nature involves students in social contexts where they are required to think, talk, manipulate concrete materials, and share view points in order to arrive at decisions. Thus, through drama, students explore both factual knowledge and content concepts while "trying on" social experiences. Heathcote believes that drama confronts students with situations that may change them because of the issues and challenges they must

#### Introduction

The classroom teacher must address the challenge of creating an instructional environment that bridges what students know with what they want to know. Beane (1992) states that genuine learning involves an interaction between the learner, the environment, and the content; this interaction integrates what we experience into our system of meanings. Drama can initiate interaction. It empowers this students to learn new knowledge and also, as Bolton (1984) has noted, enables them to understand more deeply what they already know. Dramatic episodes actively engage students and contribute to ownership of the educational process. Thus, drama is action in the present. This action prevents academic content from appearing lifeless, abstract and beyond understanding. Piaget points out that physical activity can lay the groundwork for developing abstract mental concepts. Thus, drama provides students with a means of living through content in a way that deepens their understanding and appreciation of the subject. Our goal was to introduce dramatic approach of learning in the classrooms and to convey the ideas in a much easier and fruitful manner.

\*Corresponding author: kssibi1@gmail.com Case Study

lecture

its two

As a part of introducing the oLet Q1 is in on state and let Q2 dramatic method of learning in our classroom we made an initial o So Vc1=0, and Vcc will drop

o So Vc1=0, and Vcc will drop completely across Q1 ,so Vc2=Vcc o Now C1 will be in charging state. As C1 charges base-emitter voltage across Q2 will increases and Q2 will turns to on state when the voltage is sufficient o When this happens Vc2=0, Leads to conversion of base-

emitter voltage of Q1 to 0 o Now Q1 is in off state and Q2 will be in on state

will be in on state o Meanwhile C2 charges, so baseemitter voltage of Q1 increases and it will turns to on state, when voltage is sufficient

o This process continuous and produces rectangular waves at the collector of each transistors.



T1 = 0.69 R1C1 and for Q2 T2 = 0.69 R2C2

 $\begin{array}{l} T = 0.05 \ \text{Km} \cdot \text{Period} \ \text{of the wave} \\ T = T1 + T2 = 0.69 \ (\text{R1C1} + \text{R2 C2}). \\ \text{If } \text{R1} = \text{R2} = \text{R} \ \text{and} \ \text{C1} = \text{C2} = \text{C} \\ \text{Then } \text{T} = 1.38 \ \text{RC} \end{array}$ 

The Act - Planning and Execution The explanation of the working of the above circuit was a tedious process and the conventional method of describing the circuit action through lecture was found to be ineffective in conveying the idea with clarity. So we planned to introduce dramatic method in explaining the circuit action. In order to explain the accurate working the different states of the 6 components at various times of circuit action should be demonstrated to the students. For this 6 volunteers from the students were called and arranged in the form of the components as shown in the circuit diagram. Placards were given to the the volunteers so as to represent their state. The states of the components vary with time and at any instant of circuit action the volunteers are instructed to raise the placard which denotes their state at that instant. Another volunteer was selected to represent the output state.

We have two output states a maximum state and a minimum state, placards corresponding to these states are given to the volunteer and was instructed to raise the placard corresponding to output at that instant. teacher gives sufficient instructions to the volunteers at regular intervals of time and their demonstrating the circuit bv action to other students and also the variations of the output with respect to various time intervals The teacher can also use a board and marker as aids to draw and explain the variation of the output waveform. Feedback has been collected after the drama and replayed with essential changes



The introduction of dramatic approach of teaching can enrich and sustain students' understanding, not only as they develop their own dramatic interpretations, but also as they contemplate the work involved in dramatization.

Providing opportunities for learners to engage in dramatic activities tends to improve students' attitudes toward learning. This improvement stems from the opportunity to make unique, individual contributions to their learning through drama. Clearly, the technique offer teachers a practical technique to implement an active approach that engages students as they seek to master content.

#### References

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Mashington DC: National Edu-

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(RC) time constant.

effort to using this technique in explaining the working of Astable

Multivibrator as the theoretical

explanation was confusing and was difficult to convey the idea

ordinary

**Theoretical Background** 

An Astable Multivibrator or a

Free Running Multivibrator is the multivibrator which has no

stable states. Its output oscillates

unstable states without the aid of

external triggering. The time

period of each states are

determined by Resistor Capacitor

continuously between

through

methods.

In the above diagram we can find two transistors which is wired as a switch.When a transistor is ON, its collector and emitter act as a short circuit. But when it is OFF they acts as open circuit. So in the above circuit when a transistor is in OFF state its collector will have the voltage Vcc and when it is ON its collector will be grounded. When one transistor is ON the other will be OFF. The OFF time of transistor is determined by RC time constant. When the circuit is switched on, one of the transistor will be more conducting than the other due imbalance in the circuit or difference in the parameters of the transistor. Gradually the more conducting transistor will be driven to Saturation and the less conducting transistor will be driven to Cutoff.

#### Working

o Vcc voltage is applied o One of the transistors will be more conducting than the other due imbalance in the circuit or difference in the parameters of the transistor. Gradually the more conducting transistor will be driven to Saturation and the less conducting transistor will be driven to Cutoff. Conti..

#### USE OF K-W-H-L-A-Q CHARTS AS A MEANS FOR EFFECTIVE ENVIRONMENTAL EDUCATION

Muhammed Mansoor A Teacher Educator Govt. Teacher Education Institute, Alappuzha

#### Background

KWL chart is an instructional strategy developed by Donna Ogle(1986). Students begin by brainstorming everything they know about a topic. This information is recorded in the K column of the chart. Students then generate a list of questions about what they want to know about a topic. These questions are listed in the W column of the chart. After learning about the topic, students answer the questions that are in the W column. This new information they have learned is recorded in the L column of the K-W-L chart. Purpose

- Elicits student's prior knowledge of the topic.
- Sets goals for learning
- Students became active learners
- Suitable for self learning as well as guided learning
- Importance to reflections Limitations
- Students must have prior knowledge relevant to the topic

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#### **KWHLAQ** chart

KWHLAQ chart is the modified version of KWL chart. This graphic organiser helps students organise information before, during and after a unit or a lesson. KWHLAQ chart was developed by Kimberly Baker and Silvia Rosenthal Tolisano individually Merits

Fosters inquiry Fosters Metacognition Fosters reflection Stresses the application of acquired knowledge

#### Use of KWHLAQ chart in Environmental education

KWHLAQ chart can be effectively used in environmental education as a self learning inquiry based technique.

Summary of Investigation - "INNOVATION"					
	Stope	Realts			
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w	War is 1 gestion is find set" (identify sim of reporters)				
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L	Washers (jamad)				
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Q	What new guestions do l'hore. Solowing ner inpiny?				

#### An illustration of KWHLAQ chart in Environmental Education: Topic: Sustainable development

K-What i know about the conceptsustainable development.

W-What do I need and want to know about sustainable development.

H-How can i find answers to my questions.(explores options, creates a plan, implement the plan).



L-Reflects on what i have learned about sustainable development.

A-How will i apply the concept of sustainable development in my life.

Q-What new questions do i have about the concept

The inquiry process proceeds in a cyclic manner. That is a learner can go from the "Q" stage to the "H" stage.



### ANCIENT VALUES IN 21st CENTURY CHARACTER EDUCATION CONTEXT



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the intellectual disciplines. The 20st century should include a balance between spiritual and material world In the given context through community partnership

ONATHARA BINITA

Senior Research Fellow

Farook Training College and Research Centre in Education, Farook College (PO), Kozhikode,Kerala 673 632

DR. M. JESA Associate Professor





#### Crowdsourcing Applications as Tools for Research and Experiential Learning in Environmental Science

Dr.Uday Sankar S.Nair & Dr.Divya C.Senan Department of Atmospheric Science, University of Alabama in Huntsville, USA

#### Introduction

Environmental education and literacy are now a critical part of the STEM skill set and are particularly important for building a 21st-century workforce. Environmental education can provide students with opportunities to engage in meaningful and exciting scientific studies that can spark their interest in STEM and empower them to take part in solutions to local environmental challenges. Achieving the broad range of goals of environmental education requires an interdisciplinary approach, blending education with the learning, social, behavioral, and economic sciences as well as earth systems science. Environmental Education is a multidisciplinary. interdisciplinary, and Trans disciplinary field (Krasny & Dillon 2012; UNESCO 1997).

Preparing our youth for a future of environmental instability begins by helping them understand the workings of the earth, why and how environment change (past and present) takes place, and what consequences it is likely to have on various ecosystems, including their own. It should make students understand how energy consumption in one place affects living conditions of people on the other side of the world and how we all depend on the same atmosphere for life. Also it requires students understanding of current and future climate solutions and should learn to weigh their potential against their risks. Well prepared individuals will be able to investigate climate change sources and impacts: framing local problems for study, collecting and interpreting data, building informed arguments.

We propose that new technologies (crowdsourcing apps) that are being used in research settings to solve interdisciplinary problems may also be used in STEM education for experiential learning of environmental science

#### Motivation

Environmental science is especially suited to experiential learning models because of the strong links between environmental change and human activity.

Technological advances makes it possible to implement hands-on approach for environmental science learning in K-12, using tools that were accessible only to laboratories and universities until the last few years.

All important aspects identified by experiential learning theories can be effectively incorporated through the proposed hands-on approach to environmental science education. PEERA: Public Environmental Education and Research App



A mobile application (Android platform), based on the Open Data Kit (ODK), for populating a Google Earth Engine based Land Use Land Cover ground truth database is developed. The Open Data Kit (ODK) based application is intended for crowdsourcing of ground truth information regarding the nature of Land Use and Land Cover (LULC). The ODK (Open Data Kit) is a set of tools that allows data collection using mobile devices and data submission to an online server, even without an internet connection or mobile carrier service at the time of data collection. The data collected will be used for classification of unprecedented amount of satellite imagery being collected and archived by the different space agencies. The ODK LULC application will also be utilized for educational purposes, to provide hands-on experience con earth science concepts. The tool is used to collect first-hand information upon which the students can reflect and for concepts to solve environmental issues



#### Kolb's Experiential Learning Model

According to Kolb, concrete experience provides the information that serves as a basis for reflection. From these reflections, we assimilate the information and form abstract concepts. We then use these concepts to develop new theories about the world, which we then actively test. Through the testing of our ideas, we once again gather information through experience, cycling back to the beginning of the process. In the experiential model, Kolb described two different ways of grasping experience: Concrete Experience and Abstract Conceptualization. He also identified two ways of transforming experience: Reflective Observation and Active Experimentation. These four modes of learning are often portrayed as a cycle.



#### Using Crowdsourcing Application, PEERA as tool for experiential learning

Changing of land cover and land use (deforestation, urbanization etc.) is one of the major influence that humans have on the environment. Understanding and predicting how human settlements change land cover is important and is often related to socioeconomics. Experiential learning model could be utilized to understand drivers of land cover change.

The proposed model tries to incorporate the use of mobile apps into the various phases of experiential learning cycle. The proposed experiential learning model includes four specific steps:

#### Concrete experience:

Students identify changes in land cover and utilization that they have experienced in their neighborhoods. Students use Android mobile application to collect a sample of geo locations for different land cover types and upload it to the server. Students collect and aggregate three ground truth observations using USGS\_LULC form by configuring with ODK Collect ap



Reflective observations:

Students upload the collected data to the server and visualize the collected data in a fusion table and will discuss their experiences as a group. Discussions will focus on their thoughts and will provide differing views on the topic.

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Abstract conceptualization: Students analyze the Multispectral ASTER imagery classified using GEE and just three ground truth observations and construct conceptual understanding that integrates one's observations into logically sound theories

#### Active experimentation:

Students classify satellite imagery and understand how their neighborhood have changed over the years. They can visually see how urban regions grow, crop lands shrink and forests disappear

Students generate new knowledge or theories to make decisions or to solve real life problems.



#### Conclusions

We propose that crowdsourcing applications and other associated technologies may be utilized to implement experiential learning in school and university curriculum

The information generated by the students can also be utilized by the researchers. Thus students will be both recipient and generator of knowledge

We are developing a series of dual purpose crowdsourcing apps and associated curricular implementation for use in schools and colleges within US and India



UAH's Dr. Udaysankar Nair, left, worked with Dr. Divya Senan from Sree Narayana Training College in Kerala to develop Public Environmental Education and Research App (PEERA)curriculum



COB 401 PROJECT AND VIVA VOCE is a 15 credit course offered to the MSc Computational Biology students to impart hands on experience in developing a solution to real life bioinformatics problems in a professional manner.

#### Requirements & Features of the monitoring system

Students are required to carry out a four month individual project and submit a dissertation embodying the findings of the same Project should be selected at least 6 months prior to commencement. Planning Docket (Part A) designed to help the students to do the same. Students have to submit 3 Project Progress Reporting dockets (Part B) along with Work Reports as indicated in the weekly planner (Part C). For Student Peer Review - (Part D), Interim Review (Part E), Self Evaluation Report (Part F) has been designed.

For Final External Evaluation an evaluation rubrics has been designed which forms the Part G of the Project management docket.

DEPARTMENT OF COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

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#### Arya S A (MSc 2013- 2015 Batch)

The project docket, as an enhancement to the project work predominantly deals with the progress and gradual development of a project work. It is an indirect key to the growth and regrowth of a project which updates on a monthly basis. Instead of a perplexing and monotonous whole sum summary, the partial and detailed synopsis through a project docket will brief the recent aspects and development of a project. Literally the project docket is a best method of self-criticism, assessment and appreciation of a project work, in which our own rating and concerned guide's rating is eventually evaluated. As far as concerned to my project and from my experience I recommend the project docket as an essential means of evaluation of project work.

![](_page_26_Picture_15.jpeg)

#### Jiffy John (MSc 2012- 2014 Batch)

I had done my MSc. final semester main project from one of the best Bioinformatics Institutes in India, IGIB, New Deithi. My main project experience was the most memorable one. I think our departments "project monitoring system" had liberalized the difficulties of the work. The documents consist of a project docket, weekly planner, completed chapters, work report, 1 slide opt. To slide ppt. Last working day of every month, students should send this document to the internal guide. So our project is continuously evaluated by both internal and external guides. If helped to assess our current project status and help us to plan for the next month work. For my project I had strictly followed this monitoring system. It helped me a lot, to complete my project within the duration. And after 4 months I came up with a masterpiece work. The Introduction of Cultural Studies at the University of Kerala: A Story of Academic Exigency and Cultural Critique

My greatest contribution to academic pursuits in Kerala was the efforts I took in introducing a Core Course in Cultural Studies, first at the Postgraduate level at the Institute of English and subsequently in the colleges under the University of Kerala where MA in English was being offered. Film Studies at the UG level and Cultural Studies at the Post Graduate and MPhil levels have brought in a paradigm shift in English pedagogy in Kerala. Dr.Meena T Pillai Director Centre for Cuttural Studies University of Kerala

![](_page_27_Picture_3.jpeg)

The last two decades have witnessed a crisis in the English Departments in India. Liberalization of the Indian economy and the largely ambivalent phenomenon of globalization spawned a new critical enquiry in the academics that proved critical in looking at canonical texts in English. There was a questioning of the relevance of English, the need to reinvent English studies to suit the exigencies of our contemporary socio-cultural milieu and use the tools and methodologies of English Studies to bear upon our current postcolonial locations marked. The course in Cultural Studies was able to tap into these contradictions and paradoxes in the pedagogy of English in Kerala. It was interdisciplinary and multidisciplinary in its focus and method and sought to look at the knowledge power nexus within all academic exercises.

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"My training in cultural studies helped me overcome one of the great challenges of English classrooms in India - the question of relevance and privilege in a twenty-first century setting. The possibility of the course lies in the fact that per English may be employed in critically translating my culture and its struggles into world acadamedia. The scholarship and methodology | was introduced to in the course of this training stood me in good stead in applying for national and international grants and fellowships such as the KCHR doctoral fellowships and the Fulbright grants for reasearch." (Sucheta Sankar who Isregistered for her PhD with me and is currently IRpursuing her Fulbright Doctoral Research at the Brandeis University, Massachusetts, USA.)

"Cultural Studies is a course that broadened the horizons of our program in English Language and Literature and gave us new insights into how we relate to the society. It leads the learners beyond the discussions around literature and makes them critically approach all forms of culture which they encounter as much frequently, if not more. Doing the course helped me to become conscious of the many meanings that saturate our lives in different cultural spaces and products. It enabled me to think about and sometimes critique my own position as someone who knowingly and unknowingly takes part in the production of culture. As a learner, I find Cultural Studies interesting as it familiarises us with an area of study that brings us closer to our everyday life and puts it in perspective." (Meera-C. - First Rank with UGC, JRF, 2014- 2016 MA Batch, Institute of English)

![](_page_28_Figure_0.jpeg)

#### POSTER PREPARED

By

**Jasmin asaf & Priyamol TK** 

**Research scholars** 

**Department of Education** 

University of kerala

#### **TECHNOLOGY ENHANCED LEARNING – Smart Phone as a tool for Class Assignments**

![](_page_29_Figure_1.jpeg)

![](_page_30_Figure_0.jpeg)

THERE IS A GREAT SALING "I HEAR - I FORGET, ISEE - I REMEMBER IDO-I UNDERSTAND". LEARNING SHOULD ALWALS PROCEED FROM SIMPLE TO COMPLEX, EASY TO DIFFICULT, RINOWN TO UNRINOWN, AND FROM CONCRETE TO ABSTRACT.

![](_page_31_Figure_1.jpeg)

MAYAMILLAI ASSOCIATE PROPESSOR, P.K.M. COLLEGE, MAQAMPAM

![](_page_32_Picture_0.jpeg)

## Design Thinking - Process of Problem Solving

Philomina Simon, University of Kerala, Shaji.K, Infosys Ltd

#### Introduction

Design thinking helps in generating a solution based on creative strategies. It is a solution focused thinking which helps us to produce a result. Design thinking focuses on Learn from people, Find patterns, unique design techniques to solve the problem, Make the solution tangible and iterative it relentlessly. Design thinking connects need into demand[1]. Innovation in products generally happen by connecting their needs in the real life experience which concentrates on principles of Human Centered Design. Design thinking helps us to recognize patterns and ideas that have got an emotional impact rather than only being functional innovations.

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Figure 1: Steps in design thinking

DESIGN

#### Attributes of Design Thinking

The human rule[2], which states that all design activity is ultimately social in nature, and any social innovation will bring us back to the 'human-centric point of view'. The ambiguity rule, in which design thinkers must preserve ambiguity by experimenting at the limits of their knowledge and ability, enabling the freedom to see things differently. The re-design rule, where all design is re-design; this comes as a result of changing technology and social circumstances but previously solved, unchanged human needs. The tangibility rule; the concept that making ideas tangible always facilitates communication and allows designers to treat prototypes as 'communication media'.

#### Process of Design Thinking

The design process typically begins in the Inspiration space[1] after identifying a problem that motivates people to search for a solution. The tasks include interviews, listen what people have to say. Next in the ideation space, after identifying the activities in the inspiration space, it needs to be synthesized to identify the solutions of the problem. The major task is brain storming which is performed to generate ideas. In this implementation space, the ideas generated are used for prototype creation.

![](_page_32_Figure_9.jpeg)

![](_page_32_Figure_10.jpeg)

#### Conclusion

Design thinking is a new innovative way of building products that relates to Human Centered Design. The three pillers of the process of design thinking are Inspiration, Ideation and Implementation spaces. Design Thinking[3] attempts to inspire the essential element of creativity, the ability to take an abstract idea and create something with it. Design thinking involves empathy for those you are designing for. The vital insight of design thinking is the creativity that it needs to build and it is an evolving process. Desing thinking helps to build the product and experiences based on customer needs and requirements.

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- 2. https://en.wikipedia.org/wiki/Design thinking
- https://www.forbes.com/sites/reuvencohen/2014/03/31/desi gn-thinking-a-unified-framework-for-innovation/

![](_page_32_Figure_17.jpeg)

Figure 2: Design Thinking Terminologies

idea

![](_page_33_Picture_0.jpeg)

![](_page_33_Picture_1.jpeg)

Figure 1: Mandelbrot Fractal

![](_page_33_Figure_3.jpeg)

Figure 2: Stochastic Fractals

![](_page_33_Picture_5.jpeg)

![](_page_33_Picture_6.jpeg)

![](_page_33_Picture_7.jpeg)

Figure 4: Fractal Fern

#### **Teaching Model based on Fractal Design**

Philomina Simon, Department of Computer Science, University of Kerala

#### Introduction

In this world, we can observe objects that exhibit a particular shape and structure that is represented by Euclidean geometry. There are certain objects which are very complex in nature and it cannot be accurately represented or measured by Euclidean geometry. Such type of objects are represented by Fractal Geometry. The term Fractal is coined by Mandelbroth. Fractal[3] can be considered as a rough or fragmented geometric shape that can be subdivided in parts, each of which is at least a reduced-size copy of the whole. Fractals correspond to a general idea that a given object especially a textured area can be represented by similar characteristics "repeated" at different scales. Fractals are generally self-similar and independent of scale. Its form is extremely irregular or fragmented, and remains so, whatever the scale of examination. It contains "distinct elements" whose scales are very varied and cover a large range. The fractal is generated by iterations. The fractal which exhibits complex structures have a fractional dimension. A teaching model[1] can also be generated from this fractal concept where self similar tasks or activities are given to enhace the learnability of the students. This is a student centric teaching methodology.

#### **Fractal Generation - Methods**

There are three methods to generate the fractals. Escape-time fractals are defined by a formula or recurrence relation at each point in a space. Eg. Mandelbrot set. Iterated function systems have a fixed geometric replacement rule. Eg. Cantor set, Sierpinski carpet, Sierpinski gasket, Peano curve, Koch snowflake. Random fractals are generated by stochastic rather than deterministic processes. Eg. Trajectories of the Brownian motion, Lévy flight, fractal landscapes and the Brownian tree. Strange attractors are generated by iteration of a map or the solution of a system of initial-value differential equations that exhibit chaos.

#### **Fractals in Nature**

![](_page_33_Picture_16.jpeg)

#### Teaching as a Fractal: from Experience to Model

A teaching model based on instructional design as well as on the principles of fractal geometry[1] is presented. Teaching based on Fractal Geometry in the sense that different levels of abstraction for the various training activities are presented and the activities are self-similar, that is, they are decomposed again and again. At each level, an activity decomposes into a lower level tasks and their corresponding evaluation. With this model the immediate feedback and the student motivation are encouraged.

#### Conclusion

Fractals can be used to represent complex objects with their fractional dimension. A general introduction of fractals and the methods for generating different fractals is discussed. A teaching model based on fractal design is focused in this poster. Each training activity is integrated by lower level activities and so on Therefore it is a model focused on the task. Learning is student-centered, who performs multiple activities that make up the different levels of the fractal model. Students learn by doing rather than listening to the teacher's explanations.

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## THE SYNECTIC MODEL FOR TEACHING ENGLISH

CURRICULUM FAIR AND EXHIBITION – UNIVERSITY OF KERALA, TVM, MARCH 15- 16, 2017 Prasanth R. , Assistant professor, KUCTE, Nedumangad

#### What are Models of Teaching?

Models of teaching were identified and described for the first time by *Bruce Joyce and Marsha Weil* (1980). They defined a model as: "A model of teaching is a set of inter-related components arranged in a sequence which provides guidelines to realize a specific goal. It helps the designing instructional activities and provides an environment carrying out these activities in order to realize the stipulated objectives". 'Models of teaching' are a pattern or plan which can be used to shape a curriculum or course to select instructional materials and to guide a

teacher's action

#### Synectic Model

In 1961, William J.Gordon and his associates designed a very interesting and delightful experience to the development of innovations known as Synectics. The model was originally designed to form 'creativity groups' in industrial and other organizations to solve problems, to develop quality products.

#### Characteristics of Gordon's Model

- Creativity is important in everyday activities. Gordon's model is designed to increase problem solving, creative expression, empathy and insight into social relations.
- The creative process is not at all mysterious. It can be described, and it is possible to train persons directly to increase their creativity. (Traditionally creativity is viewed as a mysterious innate and personal capacity)
- Creative invention is similar in all fields- the arts, the sciences, engineering and is characterized by the same underlying intellectual processes
- Individual and group invention (creative thinking) are very similar .Individuals and groups generate ideas and products in much the same fashion.

The main technique used is analogy. The learner is lead into an 'imaginary/ illogical world' to see things never seen before to express himself in novel ways, to approach problems from a different angle which is entirely different from others as is perceived by the mind's eye through 'fresh ways of thinking'. He has to express his ideas clearly and also grasp ideas clearly and comprehensively

## Steps of the Model to be followed in the Classroom

- 1. Describe the topic-
- 2. Create direct analogies
- 3. Describe personal analogies
- 4. Identify compressed conflicts
- 5. Create new direct analogy
- 6. Re-examine the original topic
- 7. Evaluate

#### Tips for the Teacher:

 Create direct analogies: What words have the same or similar meaning?(try synonyms)

\* Describe personal analogies: What would it feel like to have the characteristics or traits of ---?( describe emotions and physical attributes)

 Identify compressed conflicts; What words have the opposite meaning or characteristics? (Use antonyms)

\* Create new direct analogy: What words have the similar or same meaning?

This repeats the prompt from the second step. The difference after going through the first three lists you will have gone deeper into the subject and this list will reflect that depth.

#### Synthesis:

\* Look at all the four steps and find key words or phrases, expand on those to generate more. Finally, focus on a theme that may incorporate several elements based on the final list.

## Geology field work -Touring through time - Yoga of Geology Curriculum

#### Introduction

#### Field geology

of Kerala, India was established in M.Sc. M.Phil. and PhD.

We practice innovative teaching Why do you choose the subject- geology? methods.

We make geology learning a pleasant experience. Field work is one of the innovative practices of the Geology department Take Your Students Beyond the Classroom

A great deal of geology learning takes place outside of the

memorable and most valuable - the experiences they tell their friends about.

Geological past leads you to beautiful, interesting sites and you can unravel the earth history.

Field work gives the idea , how geology is related the real world, and what the students can do with geology PG degree.

The Department of Geology, University Field work forms an integral component in geological studies. A basic understanding of field methods in geological studies is a must for 1963. This 50-year old department has becoming a professional geologist. This innovative eight faculty member. The Dept. offers teaching method gives a rare opportunity for students to see the earth, its natural resources and

environmental hazards.

Geology is linked to the real world and window to see the earth processes and resources.

You can become a geologist, one of the fascinating jobs of the world.

Earth and rock exposures : Outdoor hands on labs. Field training is a process of good teaching, preparing students to succeed in the life and contribute to the country.

A geologist studies earth processes such as earthquakes, landslides, floods, and volcanic eruptions to survey land and draw up safe building plans. When geologists investigate earth materials, not

classroom, and these are often the only do they investigate metals and minerals, but they experiences that students find most also look for oil, natural gas, water and other

![](_page_35_Picture_18.jpeg)

![](_page_35_Picture_19.jpeg)

![](_page_35_Picture_20.jpeg)

![](_page_35_Picture_21.jpeg)

![](_page_35_Picture_22.jpeg)

![](_page_36_Figure_0.jpeg)

![](_page_36_Figure_1.jpeg)

<u>Developed by</u>

Prasheeda. P, Senior Research Fellow, Farook Training College, University of Calicut

#### **COGNITIVE NEUROSCIENCE: IMPLICATIONS FOR EDUCATION**

#### ROOBINA SONIA S R & ROSHNA V GOPAL RESEARCH SCHOLARS, UNIVERSITY OF KERALA

#### INTRODUCTION

#### PRINCIPLES OF BRAIN BASED LEARNING

#### CURRICULUM

Cognitive neuroscience is the scientific field that is concerned with the study of the biological processes and aspects that underlie cognition, with a specific focus on the neural connections in the brain which are involved in mental processes.

Cognitive neuroscience is an interdisciplinary field of research that focuses on the study of the neural bases of cognition. One of the major goals of cognitive neuroscience is to identify the parts of the brain that mediate various constituent cognitive processes. This epoch-making discovery in cognitive neuroscience has come to be known as lateralization of hemispheric functions. In order to be 'whole brained' in their orientation, the curriculum should include equal weightage to art, creativity, skill of reasoning and thinking.

![](_page_37_Picture_7.jpeg)

#### **BRAIN BASED LEARNING**

Brain based learning theory is based on the structure and function of the brain. Brain based education is about the mind to work without distractions. Jensen (2000) defines brain based learning as "learning in accordance with the way the brain is naturally designed to learn".

It is a current learning theory bridging educational practices to the field of neurobiology. It is based on the function and structure of the brain. It is the active engagement of practical strategies based on learning and behavioral principles derived from neuroscience.

#### •The brain is a complex adaptive system.

Every brain is uniquely organised.

•Every brain simultaneously perceives and creates parts and wholes.

Learning involves both focused attention and peripheral attention.

 Learning always involves conscious and unconscious processes.

- Learning is enhanced by challenge and inhibited by threat.
  Emotions are critical to patterning.
- Brain understands and remembers best when facts and skills
- are embedded in natural spatial memory.
- •The search for meaning occurs through "patterning".
- The search for meaning is innate.
- The brain is complex and interconnected
- Learning is developmental
- The brain is a complex adaptive system.
- The brain is a social brain.

#### IMPLICATIONS FOR EDUCATION

Cognitive neuroscience has a lot of implications in the field of education and it affects several areas of brain development such as problem solving, decision making, reasoning power etc.

Problems in mathematics learning such as dyscalculia, understanding of mathematics concepts and affective factors has been discussed by shedding lights on cognitive neuroscience. Dyscalculia is caused by a brain level deficit of the number sense and the disorder stems from a problem in using numerical symbols to access the number sense information. Since different neural mechanisms contribute to different elements of mathematical performance, it may be noted that children with dyscalculia show variable patterns of abnormality at the brain level.

The aim of educational neuroscience is to generate basic and applied research that will provide a new trans disciplinary account of learning and teaching, which is capable of informing education.

A teacher must constantly search for including new techniques of brain based education and design a proper brain based learning environment for the students. It provides a biologically driven framework for teaching and learning, and helps recurring learning behaviors. Teachers must promote active learning through incorporation of research on brain-based education and the corresponding academic needs of the student. Advancements in neurological science and the growing understanding of the interconnectedness of the brain and mind present new possibilities that can lead to the enhancement of the learning for all students. The knowledge of how students pay attention, take in new information, process that information, and then store knowledge in memory is crucial for teachers. Teachers should use multiple, varied activities, such as projects, group work and field trips.

Brain based learning provides teachers with a format for using research in the neurosciences as well as research-based effective instructional practices to guide them in planning, implementing, and assessing a sound program for all learners. Teachers who utilize brain-based strategies in the classroom to enhance their students performance are seemingly better able to positively impact learners on social, emotional and cognitive levels.

#### CONCLUSION

The rapid progress in research in cognitive neuroscience is producing new insights that have the potential to help us understand teaching and leaning in new ways.

Brain based learning provides new directions for educators who want to achieve more focused and informed teaching. Brain based research needs to be interpreted for educators so that they can utilize this information in the classroom. Teachers and educators of future teachers are in a unique position to bring about a paradigm shift that recognizes brain-based teaching methods as effective educational practices.

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## CURRICULUM PAIRsout & EXHIBITION March 1.4, 2017

#### Introduction

The e-learning devices are changing its level from desktop top to laptop, laptop to tablet and now from tablet to smartphones. Low cost mobile technologies can be used to maintain and enhance contact with students and teachers, and, by logic and improve retention. As mobile phones become more ubiquitous, they are arguably well positioned to play a more central and effective role in providing students with much needed information. The e-learning devices are changing its level from desktop top to laptop, laptop to tablet and now from tablet to smartphones.

### **MOBILE** LEARNING

![](_page_38_Picture_4.jpeg)

#### Exploring opportunities and challenges of Mobile Learning Apps in Physics Instruction

CURRICULUM FAIR AND EXHIBITION - UNIVERSITY OF KERALA, TVM, MARCH 1-4 2017

Dr. Asha. J.V, University of kerala, TVM, INDIA Smitha Josey, Department of Engineering, Higher colleges of technology,UAE Sandhya Kattayat, Department of Engineering, Higher colleges of technology,UAE

#### RESEARCH PROBLEM

The physics environment is normally unfriendly with the students due to its conceptual and arithmetic application aspects. But the technological aspect of contrivances such as mobile phones is pleasent and mind blowing to the students. How technological advancement of smartphones can be used in instruction of physics, brings the challenge to the instruction The apps in physics can be used as an aid in instruction of physics as it elevates students attention to an interesting level with room for cognitive development through practices. This brings a question 'how' mobile technologies can be used to improve students' achievement. The portable size of mobile tools with characteristics such as blended, private, interactive, collaborative, and instant information elevates this device to user friendly.

## HOW CAN MOBILE PHONES USED FOR LEARNING Browning Information Becomment Assessment Becomment Becomment Becomment

![](_page_38_Figure_11.jpeg)

RESEARCH

The pre and post test techniques followed by statistical analysis of result will give a good clarification of impact of such modern instructional techniques

#### **Recommendations and**

#### Conclusions

The results showed that the teaching learning process using mobile apps is helpful to the students in improving their learning achievements in physics.Mobile learning in physics has many advantages such as to improve literacy and numeric skills, which can be used for independent and collaborative learning experiences, helps learners to identify where they need assistance and support, helps to overcome the digital divide, to make learning informal, helps learners to be more focused for longer periods, to raise self-esteem and self-confidence. Low cost mobile technologies can be used to maintain and enhance contact with students and teachers.

Each elements of mobile learning should be prepared carefully, and should be self paces and student centric. All learning environment and the learning activities should use students maximum potential and should train them cognitively. Otherwise, positive results cannot be expected from the mobile application. The power of m-learning technology can be leveraged by complimenting the existing courses with value-added features such as alerts, personalized agents or communications aids, and access to interaction or discussion utilities that help users convert their dead-time to productive activity while in transit without an access to computers and Internet.

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[1] Colcroft, Rachel S and Towers, Stephen and Smith, Judith and Bruns, Axel (2006) Mobile learning in review: Opportunities and challenges for learners, teachers, and institutions. In Proceedings Online Learning and Teaching (OLT) Conference 2006, pages pp. 21-30, Queendand University of Technology, Bristone. 21 Bharat Inder Fondar & Lalins S. Kumar International Review of Research in Onen and

![](_page_39_Picture_0.jpeg)

"The greatest thing in this world is not so much where we stand as in what direction we are moving." Johann Wolfgang von Goethe Poet, Playwright and Novelist

#### 副教育教育中心

![](_page_39_Figure_4.jpeg)

#### CAPSTONE COURSES IN HIGHER EDUCATION

Sreekala A.S., Liby Cherian Research Scholars, Departmennt of Education University of Kerala.

#### INTRODUCTION

The ability to think critically is a valued personal and professional life skill. The recognition of the importance of critical thinking is evident in recent higher education reform where the purposeful decision to nurture and develop students' critical thinking abilities is among the most valued outcomes of higher education institutions. One such mechanism that has been mooted as a potential remedy to this situation is Capstone courses. A capstone course is a multifaceted assignment that serves as a culminating academic and intellectual experience for students, typically during their final year of high school or middle school.

Capstone courses are generally designed to encourage students to think critically, solve challenging problems, and develop skills such as oral communication, public speaking, research skills, media literacy, teamwork, planning, selfsufficiency, or goal setting i.e., skills that will help prepare them for college, modern careers, and adult life. Capstone courses also tend to encourage students to connect their projects to community issues or problems, and to integrate outside-of-school learning experiences, including activities such as interviews, scientific observations, or internships.

As a school-reform strategy, capstone projects are often an extension of more systemic school-improvement models or certain teaching philosophies or strategies, such as 21st century skills.

![](_page_39_Picture_12.jpeg)

Figure 1: A model for implementing a capstone\*

#### DISCUSSION

A few representative educational goals of capstone projects:

- 1. Increasing the academic rigor of the senior year.
- 2. Increasing student motivation and engagement.
- 3. Increasing educational and career aspirations.
- 4. Improving student confidence and selfperceptions.
- 5. Demonstrating learning and proficiency.

#### CONCLUSIONS

Educators, in the challenging and cooperating settings encourage their learners to construct their understandiing of the world and become creators in the educational environment.

#### REFERENCES

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scholarworks.waldenu.edu/c gi/viewcontent.cgi?article= 2192&context=dissertation s

## Mind map

≻Innovative way – Mind Map.

- > Developed by Tony Buzan 1960.
- ≻ Making notes with keywords and images.
- ➢visual and sensory tools at our disposal.
- ≻ Recollect information for long time.

We think too much about effective methods of teaching and not enough about effective methods of learning.

![](_page_40_Picture_7.jpeg)

![](_page_41_Picture_0.jpeg)

#### GLOBAL INITIATIVE OF ACADEMIC NETWORKS A key to Academic conglomeration

Govt. of India approved a new program titled Global Initiative of Academic Networks (GIAN) in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs, internationally to encourage their engagement with the institutes of Higher Education in India so as to auament the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence.

#### University of Kerak

#### Department of Commerce

The Department of Commerce was established in 1925 as a reaching and research department of the University of Kerale. Within a spon of 31 years the department apuld establish itself as a centre of excellence with focus on education, research, consultancy and extension services The Deportment offers post graduote level programmes in commerce-viz M.Com. M.Phi and Decroral programmes leading to Fh.D. Molor Achievements of the Department Include: Inclusion of the Department Under GIAN Project of M IND. Govi, of india and successful completion of SAP DRS phase LUCC

#### The Objectives of GIAN

To increase the footfalls of reputed international faculty in the Indian academic institutes.

Provide opportunity to our faculty to learn and share knowledge and teaching skills in cutting edge areas.

To provide opportunity to our students to seek knowledge and experience from reputed International faculty.

To create avenue for possible collaborative research with the international faculty

To increase participation and presence of international students in the academic Institutes.

Opportunity for the students of different Institutes/Universities to interact and learn subjects in niche areas through collaborative learning process.

Provide opportunity for the technical persons from Indian Industry to improve understandings and update their knowledge in relevant areas.

Motivate the best international experts in the world to work on problems related to India.

Develop high quality course material in niche areas, both through video and print that can be used by a larger body of students and teachers.

To document and develop new pedagogic methods in emerging topics of national and international interest. The Department of Commerce is the first department in University of Kerala to conduct a GIAN Course

#### Course on

#### Is Ethical Behavior Essential in Marketing? Why or Why not?

(December 13 - 17, 2016)

Faculty: Dr. Sumesh Nair, Murdoch University, Singapore

#### The course learning outcomes were:

 Critically evaluate the ethical value approach in marketing
 Apply marketing/ management theories and models in developing ethical values in marketing
 Assess the role of ethics and social responsibility in value creation, communication, and dissemination process in Marketing.
 Analyze new trends and directions in marketing ethics

![](_page_41_Picture_24.jpeg)

## **A HUMAN DEVELOPMENT PERSPECTIVE**

#### Multi-dimensional poverty among households in Kerala-

CURRICULUM FAIR AND EXHIBITION - UNIVERSITY OF KERALA, TVM, MARCH 1- 4 2017 rof, Baiju K.C. HoD. Dept. of E entral Universityof Kerala, K

![](_page_42_Figure_3.jpeg)

![](_page_43_Figure_0.jpeg)

#### WATER RESOURCE MANAGEMENT CURRICULUM FAIR AND EXHIBITION - UNIVERSITY OF KERALA, TVM, MARCH 15-16, 2017 Introducti Jayachandran . , Assisant Professor, School of Pedagogical Sciences, Kannur University on the planet. Water is an essential a ability will be one of the Ensuring water availa grand challenges of th ys To Conserve Water Successful management of any resources requires accurate wn and garden in the morning knowledge of the resource available, the uses to which it may be put, the competing demands for the resource, measures to and processes to evaluate the significance and worth of competing en temperatures are cooler to poration. demands and mechanisms to translate policy decisions into nts and vegetables in a pan of actions on the ground. 110 . . of running water from the Water carservation simply refers to reducing the usage of water and secucing water water for Simple Ways To Conserve Water different purposes, such (1) · When washing dishes by hand, don't let the water cleaning, monufacturing run while rinsing. Fill one sink with wash water and the other with runse water. and agricultural imposon insimentos sejinitely accounts as the Simple Ways To Conserve Water · Run your clothes washer and dishwasher only most efficient and cost when they are full. You can save up to 1,000 effective way to control gallons a month. · Some refrigerators, air conditioners and icethe use of water makers are cooled with wasted flows of water. Consider upgrading with air-cooled appliances for significant water savings. · Adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street. MICRO ACTION What can we do? Understanding the importance of Water Aware the public regarding the scarcity Info Responsibility to protect jiudicious

## INCIDENTAL LEARNING

#### CURRICULUM FAIR AND EXHIBITION - UNIVERSITY OF KERALA, TVM, MARCH 15- 16, 2017

Rajeswari V.S., UGC -Junior Research Fellow

PHRASAL VERBS

#### Incidental learning is unplanned or unintentional

Introduction

learning. It may occur while carrying out an activity that is seemingly unrelated to what is learned. Early research on this topic dealt with how people learn in their daily routines at their workplaces. Eg:

## PREPOSITION

![](_page_45_Picture_6.jpeg)

![](_page_45_Picture_7.jpeg)

Put on - clothe one self with

![](_page_45_Picture_9.jpeg)

Take off - remove clothing

![](_page_45_Picture_11.jpeg)

![](_page_45_Picture_12.jpeg)

Try on- put something on to see if it fits you or if it looks nice

![](_page_45_Picture_13.jpeg)

#### **Incidental Learning**

Incidental learning is perhaps one of the most effective teaching strategies. It allows the child to learn in a non-pressurizing environment and helps him to learn about generalization- adapting the skills that (s)he knows in any setting that (s)he is in.

However, very often we as adults miss out on the many opportunities presented to us for carrying out incidental teaching. We are so entrenched in our own learning system that education happens only in the classroom, that we fail to see the natural environment as a valuable teaching tool.

![](_page_46_Figure_0.jpeg)

Acknowledgements- All Saints' College, FLAIR, Nottingham Trent University(UK)

#### KNOWLEDGE GENERATION THROUGH THE DEVELOPMENT OF HOT SKILLS

Prepared by:

Sajeena S, Research Scholar, Dept. of Education, Thycaud

![](_page_47_Figure_3.jpeg)

### INNOVATA rning from Company's Experiences

ARE REEDED IN IN SER KOR

Dr Christabell P J Assistant Professor, Department of Futures Studies, University of Kerala christabell@keralauniversity.ac.in

#### Invention

+

Exploitation

Commercialization

+

#### Objectives

Innovation/=

- To give a better understanding about the process of innovation in real world
  - To get a clear idea on how theories related to innovation management is applied in companies

![](_page_48_Picture_9.jpeg)

#### The major topics discussed

ei.

- Role of Government in Innovation
- Globalization for Innovations
- Financing Entrepreneurial Activities
- Reducing Uncertainty in Innovation
- Strategic Innovation Process

#### Learning methodolog

- Each student was assigned to find one company from the real world
- Students used the company's annual reports, newspaper reports, websites and other reports to write their seminar report
- After evaluating the seminar report, the students were asked to make presentations in front of the whole department
- The students used videos and other related materials to show how innovation was managed in the financial, marketing and technological front in the real world

![](_page_49_Picture_0.jpeg)

### Be Innovative Yourself With Modern Pedagogical Strategies

Dr. Padma Priya P V Assistant Professor NSS Training College Pandalam

#### **Collaboration and Critical Thinking**

![](_page_50_Figure_3.jpeg)

## INNOVATIVE PRACTICES FOR POPULARISING SCIENCE

#### Introduction

In this study the investigator proposed to train B.Ed students in Science of the College in innovative practices so that they can use these techniques and strategies in the future teaching which will definitely help them to act as agents of popularizing science.

![](_page_51_Figure_3.jpeg)

#### CURRICULUM FAIR AND EXHIBITION - UNIVERSITY OF KERALA, TVM, MARCH 1- 4 2017

Dr Rajeswari K., Asst. Professor, Govt. College of Teacher Education, Thiruvananthapura

#### PRE REOUSITE SKILLS

Conceptual knowledge: Understanding of the concept of soft drinks ,its composition and common ill effects TECHNOLOGICAL SKILLS · Basic skills in computer · Creating power point presentation · Browsing the internet PRINTED MÄTERIALS Text book Magazines Paper cuttings SUPPLIES Survey form ,Questionnaire,Interview schedule,Power point presentation Posters, Newsletter and Notice

#### PROCRDURES

Need and significance of the project

Phase 1:

Group discussion

![](_page_51_Picture_12.jpeg)

Phase 2: Planning

![](_page_51_Picture_14.jpeg)

Proper planning was made by the students in each group under the guidance of the teacher

![](_page_51_Picture_16.jpeg)

Phase 4:

Phase 5 :

Evaluation

Group of students conducted survey for collecting details

![](_page_51_Picture_18.jpeg)

![](_page_51_Picture_19.jpeg)

Presentations made by the teacher

![](_page_51_Picture_21.jpeg)

Direct effect : The Problem based project is found to be effective for popularizing Science Nurturant Effect: Effective for developing technological skills, lifeskills and soft skills

#### ts prepare their own t

![](_page_51_Picture_24.jpeg)

Create awareness among pa lic through pres

## Digital Tools and Devices to meet the needs of Diverse Learners.

**Dr.Suma K.O.** Associate Professor N.S.S. Training College Pandalam

![](_page_52_Picture_2.jpeg)

#### Planning for individual learner

- Multimedia Environment
- Instructional Software
- Multi-sensory Teaching
- Universal Design for Learning
- Visual Timetable
- Visual Communication
- Word Prediction Software

![](_page_52_Picture_11.jpeg)

## Assistive Technology

- Listening
- Maths
- Organization
- Memory
- Reading
- Writing

![](_page_52_Picture_19.jpeg)

![](_page_52_Picture_20.jpeg)

- Abbreviation Expanders
- Alternative Keyboards
  Audio Books and Publications
  - Electronic Math Worksheet
    - Graphic Organizers
    - Outlining
    - Data Managers
    - Optical Character Recognition
    - Portable Word Processors
    - Word prediction Programmes

![](_page_52_Picture_30.jpeg)

#### Technology act as an equalizer

- Achieve greater levels of independence
- Gain confidence
- More willingly reach out to their teachers and peers to ask questions and collaborate
- Self advocate
- Challenge themselves
- Seek out new opportunities

![](_page_52_Picture_38.jpeg)

![](_page_53_Picture_0.jpeg)

## Cloud Computing In Education Anil A R, Associate Professor & HoD, Department of CSE. Sree Buddha College of Engineering. Pattoor, Alappuzha

## National Institute of Standards and Technology (NIST) Definition of Cloud Computing

Cloud computing is a model for enabling ubipativas, constraint, ex-control technolo-tacease is a shared pool of configurable computing resources (i.e.g., networks servers storage, appleatistic, and services) that can be replify provisional and riterated with mirinal intragement effort are service provide interaction. The cloud model is composed of five essential discreteristics, three service models, and four deployment models.

#### **Essential Characteristics**

-On -domaid Self-services -Broad actionsk access -Resource pooling Rapid elasticity -Mensured services

#### **Cloud Deployment Models**

Private Cloud
Community Cloud
Partic Cloud
Hybrid Cloud

#### **Cloud Service Mcdels**

Software as a service (SraS)
Platform as a Service (PauS)
Infostructure as a service (IsoS)

Major Cloud Platform and their services Cloud for Education IBM free amazon al a Google 김김./ State Selat Mage Cloud Film Amazon Nacional R Valorativos Nacional PEL: Socialita Dorganic Child Off Sector Higher Val. Social Val. Social Val. The -----North Party Inst Inst Victor An Brone MarCould, north COE and Ren (CA) FSI, MCR, CAR CAREAGE CAREAGE WORKER FACT NATION PC2 CAREAGE You You Downe Lonsa Gallery Greek Dawn Lotter Live Application Container (JPC), Chadding-og Lance, Magificentiae Cradity Levins for contaily proprioritien Apart, stand Incorp. content Incorp. Automa mechani Incorp. cont Incorp. content Incorp. conte GALS, B2, TELAN, HOAD, Wein, 2.C. Voise Earthur off and Record Ma arrent No. production Des stat Replication data, Alex Lando Bother Institut Manchave Aure Control -Production Providences adate local address contacted Lines ...... ..... Turtes. ven sert Frances Web API Tem Abri Strongeneticity Abri Mean struct, Marchanes semantized designs as the financial Concepts Care (162 Robert Approxime Carebon), 2004 Bactoris Landers in the structure of the structure of the structure (164 Robert Approxime Carebon), the structure 2004 Bactoris Landers in the structure of the structure of the structure of the structure (164 Bactoris), the structure 2004 Bactoris (164 Bactoris), the structure of the structure of the structure of the structure (164 Bactoris), the structure 2004 Bactoris (164 Bactoris), the structure of the structure of

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By starting IT services in the cloud, advanced institution can autocome numeric services and latter concentrate on offering scatters, teachers, incluip, and staff the essential tools to hep them streams.

#### Implications in Education System

No more expensive textbooks. No more modular learning materials Su expensive fundware required. No extensive software required. Bracking more, and more diverse, sudense

![](_page_55_Picture_0.jpeg)